

light from the chip 1 applied to the spectroscopic filter 81 through the dichroic mirror 79 so that thus transmitted fluorescent light may be focused by the lens 83 onto the CCD 85 for image formation. The CPU 87 converts a detection signal of the CCD 85 into an image file a data to thereby monitor the specimen distribution.

5 The CPU 87 decides whether the specimen distribution is uniformed in the specimen-introducing passage 11 (step S4). Thus, it can be decided whether such an amount of the specimen is introduced to the intersection 10 that is enough for separation and detection.

10 If it is decided that the specimen distribution is not uniformed at step S4 (NO), the CPU decides whether a predetermined time has elapsed after the specimen introducing voltage was applied (step S5). If the predetermined time has not elapsed yet (NO), the process returns to step S4. Otherwise (YES), the CPU 87 control the high-voltage supplying part 109 so as to stop voltage application, thus making a shift to a recovery routine or the next execution mode.

15 If it is decided that as shown in the expanded diagram of the intersection 10 in FIG. 7 the specimen distribution is uniformed in the specimen-introducing passage 11 and also is decided as uniformed at step S4 (YES), the high-voltage supplying part 109 switches the voltages applied on the reservoirs 15a, 15c, 15s, and 15w to apply an electrophoretic voltage for specimen separation, thus starting electrophoretic migration of the specimen (step S6).

20 In this case, the CPU 87 is continuously engaged in the monitoring of the specimen distribution in the specimen-introducing passage 11 using the monitor optical system 89, to decide whether the specimen present at the intersection 10 is injected into the separation passage 13 (step S7).

25 If it is decided that the specimen is not yet injected into the separation passage 13 at step S7 (NO), the CPU 87 controls the high-voltage supplying part 109 to stop voltage application, thus making a shift to the recovery routine or the next execution mode.

30 When it is decided that the specimen is already injected into the separation passage 13 at step S7 (YES), application of the electrophoretic voltage is continued to separate the specimen for electrophoretic migration.

The detecting optical system 105 is used to detect the specimen that has arrived at the detection position (step S8).

The operations shall be described as follows: after it is confirmed that the specimen is already injected into the separation passage 13 at step S7, the movable mirror 75 is moved to the broken-line position to apply an excited light from the beam expander 73 onto the reflecting mirror 91. The excited light from the beam expander 73 is reflected by the reflecting mirror 91 and made incident into the detecting optical system 105. The excited light from the movable reflection mirror 75 is reflected by the dichroic mirror 93 toward the surface side of the chip 1 and then converged by the objective lens 95 to be applied from the surface side of the chip 1 to the detection position of the separation passage 13.

The fluorescent light from the detection position of the separation passage 13 is applied through the objective lens 95 and the dichroic mirror 93 onto the spectroscopic element 97. The spectroscopic element 97 separates the fluorescent light from the detection position of the separation passage 13, which is then focused, for image formation, onto the CCD 101 through the lens 99. The CPU 103 converts a detection signal of the CCD 101 into an image file as data for waveform processing, thus detecting the separated specimen.

After specimen separation, the high-voltage supplying part 109 stops supplying the voltage.

Thus, by using the monitor optical system 89 provided to the apparatus, to monitor a specimen distribution in the specimen-introducing passage 11, especially around the intersection 10 between the specimen-introducing passage 11 and the separation passage 13, it is possible to decide at step S4 of FIG. 6 whether a sufficient amount of the specimen is introduced to the intersection 10 when a voltage is applied on the reservoirs to move the specimen there, so that if it is decided that a sufficient amount of the specimen is not introduced at the intersection 10 yet, the measurement can be stopped to thereby improve the reliability of the measurement results. Further, at step S8 in FIG. 6, it can be decided whether the specimen present at the intersection 10 is introduced into the separation passage 13 in electrophoretically migration, so that if it is not

migrating electrophoretically, the measurement can be stopped to improve the reliability of the measurement results.

As in the embodiment shown in FIG. 5, by providing the specimen-introduction monitor mechanism and the detecting mechanism with fluorescent-light detecting optical systems and also providing these fluorescent-light detecting optical systems with an excitation light source common to them, the apparatus can be minimized and reduced in costs as well as running costs as compared to a case where it is provided each of them. The possible aspect, however, is not limited to the above, an excitation light source may be provided for each of the monitor optical system 89 and the detecting optical system 105. In this case, the movable reflection mirror 75 and the reflecting mirror 91 become unnecessary.

Also, although in the embodiment of FIG. 5 the monitor optical system 89 constituting the sample-injection monitor mechanism covers all over the specimen-introduction passage 11 and the separation passage 13 for detection, the invention is not limited to it; for example, the specimen-introduction monitor mechanism may only need to cover, for detection, part of the whole of the specimen-introduction passage including the intersection between the specimen-introduction passage and the separation passage.

The electrophoretic chip 1 is applicable regardless of being formed therein by one separation passage 13 or many separation passages.

FIG. 8, similar to FIG. 2, shows top views for showing an electrophoretic chip in which many separation passages are formed.

The electrophoretic chip 2 is comprised of one pair of substrates 2a and 2b made of a transparent inorganic material (e.g., glass, quartz, silicon) or plastic.

On the surface of one substrate 2b are formed eight pairs of specimen-introduction passages 4 and separation passages 6 mutually intersecting using a semiconductor photolithographic technology or a micro-machining technology. Each pair of the passages 4 and 6 are arranged in a sector shape with, using a pivot, one end side of the separation passage 6 opposite to the side intersecting with the specimen-introduction passage 4, thus avoiding